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Case Report

Aortic prosthetic graft infection accompanied with esophagomediastinal fistulas: A case report

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ABSTRACT

Prosthetic graft infection is difficult to diagnose early, and hence, is associated with high mortality and morbidity rates. A 63-year-old man who had undergone surgical prosthetic replacement for an inflammatory thoracic aortic aneurysm 10 months previously visited our emergency room, complaining of chills, shivering, frequent vomiting, and back pain. He was diagnosed with severe sepsis, and a blood culture detected *Streptococcus anginosus* and *Prevotella oralis*. Repeated contrast-enhanced computed tomography (CT) scans of his chest revealed ectopic gas around the graft, and esophagogastroduodenoscopy revealed esophageal perforations at several sites. We therefore diagnosed him with aortic prosthetic graft infection accompanied with esophagomediastinal fistulas. He received medical treatment and three operations and recovered from the infection. This is a rare case of aortic prosthetic graft infection accompanied with esophagomediastinal fistulas, and we conclude that repeated CT is useful for identifying the primary infection site and invasion route in patients with suspected aortic prosthetic graft infection.

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Introduction

Prosthetic graft infection causes significant morbidity and mortality. As patients with the condition often develop severe sepsis, early diagnosis and treatment are required. However, in prosthetic graft infections, it is often difficult to identify the primary infection site, and there are no consensus criteria for diagnosing the condition. This is one of the reasons for its high mortality [1–3].

We report a rare case of aortic prosthetic graft infection accompanied with esophagomediastinal fistulas, which was successfully treated with three operations.

Case report

A 63-year-old man visited our emergency room by ambulance, complaining of chills, shivering, frequent vomiting, and back pain.

Ten months previously, he had undergone surgical prosthetic replacement for an inflammatory thoracic aortic aneurysm. On day 9 after surgery, he had a fever of 40 °C, which was successfully treated with antibiotics. The 8 units of blood cultures were all negative, and he had no fever after he was discharged from our hospital. In the evening of the admission day, he suddenly felt chills and shivering and vomited four times. He developed back pain on the way to our emergency room.

On admission, his body temperature was 39.5 °C, his pulse rate was 128 beats/min, his respiration rate was 32/min, his blood pressure was 84/51 mmHg, and his SpO_2 was 93% (ambient air). He was emergently ill but alert. A physical examination found no other remarkable findings including skin eruption or a tendency to bleed. His capillary refilling time was 2 s.

The laboratory data on admission (Table 1) detected a decreased number of white blood cells, disseminated intravascular coagulation, and renal dysfunction. As Gram staining of a blood culture detected Gram-positive cocci indicating *Streptococcus* species on the following day, a diagnosis of severe sepsis was made [4]. We administered meropenem (MEPM; 2 g/day), vancomycin (VCM; 1 g/day), and clindamycin (CLDM; 1800 mg/day) together with

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Table 1
Laboratory data (on admission).

Hb	14.2 g/dl	Glu	114 mg/dl	Na	141 mequiv./L	pH	7.38
Ht	41.4%	TP	6.1 g/dl	K	3.2 mequiv./L	$PaCO_2$	23.5 mmHg
Plt	$9.0 \times 10^4/\mu l$	Alb	3.3 g/dl	Cl	106 mequiv./L	PaO_2	93.1 mmHg
WBC	1800/μl	LDH	217 IU/L	Correct Ca	9.1 mequiv./L	HCO_3^-	13.6 mequiv./L
CRP	0.6 mg/dl	AST	49 IU/L	PT–INR	1.56	Anion gap	21.4 mequiv./L
BUN	18.57 mg/dl	ALT	23 IU/L	Fib	55 mg/dl		
Cr	1.5 mg/dl	CK	662 IU/L	D dimer	81.3 mg/dl		
		Lactate	7.9 mmol/L	FDP	462 mg/dl		

Hb, hemoglobin; Ht, hematocrit; Plt, platelet; WBC, white blood cells; CRP, C-reactive protein; BUN, blood urea nitrogen; Cr, creatinine; Glu, glucose; TP, total protein; Alb, albumin; LDH, lactate dehydrogenase; AST, aspartate aminotransferase; ALT, alanine aminotransferase; CK, creatine kinase; Na, sodium; K, potassium; Cl, chloride; Ca, calcium; PT–INR, prothrombin time–international normalized ratio; Fib, fibrinogen; FDP, fibrin degradation products; pH, potential hydrogen; HCO_3^-, bicarbonate ion.

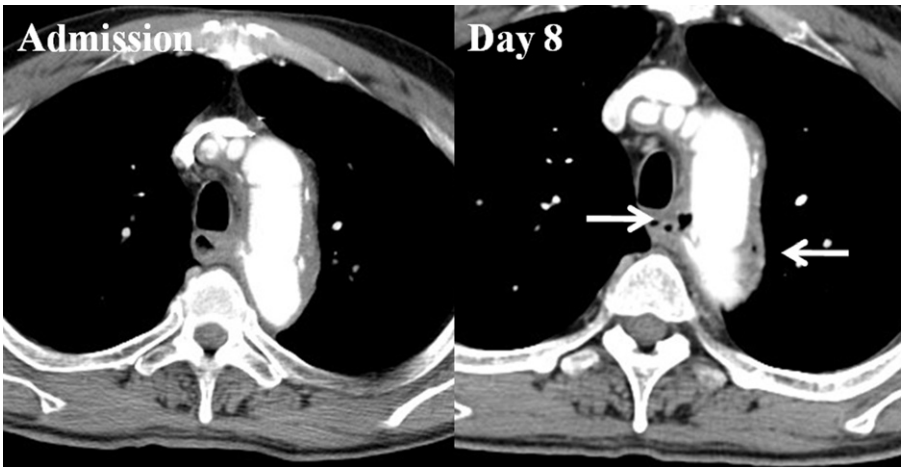

Fig. 1. First contrast-enhanced computed tomography (CT) scan performed on admission did not have abnormal findings except postoperative fluid retention and second contrast-enhanced CT scan performed on day 8 revealed ectopic gas around the graft (arrow) suggesting a prosthetic graft infection.

intravenous immunoglobulin for the following 3 days. After a subsequent blood culture detected *Streptococcus anginosus* and *Prevotella oralis* (which is resistant to CLDM), we replaced the MEPM and VCM with penicillin G (12,000 U/day). On day 7, he recovered from the severe sepsis.

The contrast-enhanced computed tomography (CT) scan on admission did not have abnormal findings except postoperative fluid retention, and other modalities also had not identified the primary infection site. However, the aortic prosthetic graft was considered to be the most probable primary infection site from clinical background. So, we performed repeated contrast-enhanced CT scan of his chest on day 8, and it revealed ectopic gas around the graft (Fig. 1). As we suspected an aortic prosthetic graft infection and esophageal perforation from these CT findings, we performed esophagogastroduodenoscopy, which revealed esophageal perforations at several sites together with the blue sutures of the graft at 25 cm from his incisor tooth (Fig. 2).

He was diagnosed with aortic prosthetic graft infection accompanied with esophagomediastinal fistulas. We planned to divide the necessary surgical procedures into three operations.

On day 23, he underwent the first operation, which involved evulsion of the esophagus and the formation of the oral side esophagostoma on the left side of his neck. On day 42, he underwent a second operation, which involved the re-replacement of the aortic prosthetic graft. Part of the esophagus adhered to the extracted graft, and a blue suture was seen in it. A culture of the extracted

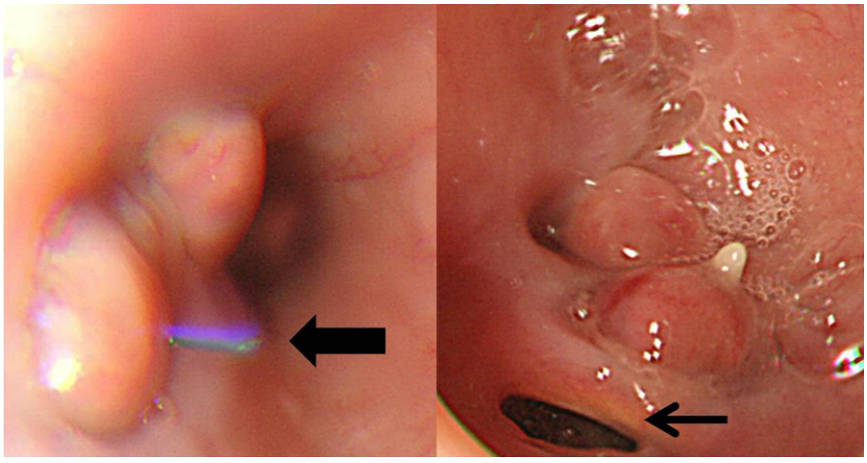

Fig. 2. Esophagogastroduodenoscopy showed the blue suture of the prosthetic graft (bold arrow) and the perforated esophageal wall (arrow).

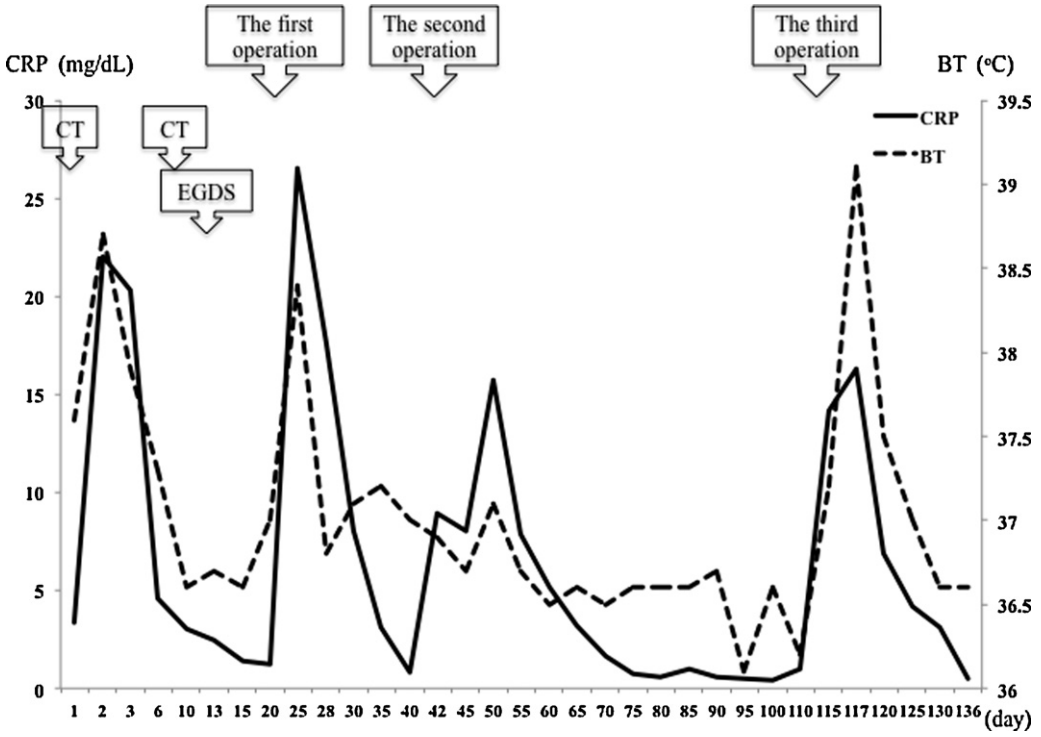

Fig. 3. Clinical course of a 63-year-old man with an aortic prosthetic graft infection that accompanied his esophagomediastinal fistulas. CRP, C-reactive protein; CT, computed tomography; EGDS, esophagogastroduodenoscopy; BT, blood temperature.

graft detected *Klebsiella*/*Enterobacter* group bacteria and *Enterobacter cloacae*. He received imipenem/cilastatin (2 g/day) from day 58 (day 16 after the 2nd operation) for 42 days. After that, on day 114, he underwent the third operation, which involved the reconstruction of his esophagus by creating an anastomosis from his pharynx to his stomach, which had been pulled upwards. His postoperative status was stable, so he was discharged from our hospital on foot on day 136 (Fig. 3). He has not developed a subsequent aortic prosthetic graft infection for 2 years.

Discussion

Prosthetic graft infections are difficult to diagnose and eradicate because their clinical presentation often only involves non-specific manifestations such as malaise, back pain, fever, gastrointestinal bleeding, and an elevated erythrocyte sedimentation rate [5]. It is reported that CT has a sensitivity of 94% and a specificity of 85% for diagnosing prosthetic graft infections when the following criteria are used: perigraft fluid, perigraft soft-tissue attenuation, ectopic gas, pseudoaneurysm, or focal bowel wall thickening [6]. On the first contrast-enhanced CT scan performed on day 1, any of the above findings except postoperative perigraft fluid were not detected despite the high sensitivity of CT. However, on day 8, the second contrast-enhanced CT scan revealed ectopic gas around the aortic prosthetic graft. Fluid can be seen around a graft for up to 1 year without being infected [6], so it was not a specific finding of prosthetic graft infection in this case. Ectopic gas around the graft detected by the repeated CT scan became a clue of prosthetic graft infection. Thus, repeated CT scan is important when prosthetic graft infection is suspected. On the other hand, magnetic resonance imaging probably has similar sensitivity and specificity to CT, but it has not been thoroughly investigated [6]. Gallium scanning can produce false positive results [7], but it is useful for confirming a diagnosis of prosthetic graft infection in combination with suspicious CT findings. CT is, therefore, the first choice imaging modality for cases of suspected prosthetic graft infection.

In this case, the blood culture detected *S. anginosus* and *P. oralis*, which are intraoral bacteria, but the culture of the extracted graft detected *Klebsiella*/*Enterobacter* group and *E. cloacae*, which are enterobacteria. We assumed that these bacilli caused the patient's infection in a multi-hit manner by invading through his esophagomediastinal fistulas. There have not been many reports of aortic prosthetic graft infection accompanied with aorto-enteric fistulas after vascular surgery, and such postoperative complications often cause gastrointestinal hemorrhaging and can be fatal [2,3]. However, in this case, the aortic prosthetic graft infection had been accompanied with esophagomediastinal fistulas but had not perforated, so the patient recovered after medical treatment and three operations. Although cases of esophagomediastinal fistulas due to esophageal cancer [8], esophageal tuberculosis [9], endoscopic ultrasound-guided fine-needle aspiration [10], or esophageal diverticulum [11] have been reported, as far as we know no cases caused by vascular surgery have ever been reported. It is difficult to confirm how the patient's esophagomediastinal fistulas formed. However, it is supposed that they were caused by prolonged mediastinitis or graft infection from the original surgery and, after that, this sepsis occurred through it. Anyway, it is rare for the invasion route of aortic prosthetic graft infection to involve an esophagomediastinal fistula.

We conclude that it is necessary to identify the primary infection site and invasion route through repeated CT scans, the patient's symptoms, and background data, and the results of blood cultures when treating patients with suspected aortic prosthetic graft infection.

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